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AUTHOR Liederman, Jacqueline; And Others
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ABSTRACT

The creation of new words through the novel combination of English words or morphemes (e.g., "map ball" to refer to a globe) was studied and compared in 40 preschool children, 40 grade school children, and 40 adults. These made-up words or lexical innovations were collected while subjects attempted to name pictured objects and were evaluated in terms of incidence, communicative effectiveness, novelty, semantic accuracy, and certain linguistic characteristics. Communicative effectiveness was established by asking naive judges to guess the intended referent of the made-up word. It was expected that the preschool children's innovations would be wild and referentially opaque. Instead, the preschool children's innovations were as frequent and as communicatively effective as those of the grade school children and adults. Grade school children produced the highest proportion of innovations with semantic inaccuracy and contamination, whereas preschool children constructed more innovations containing redundant elements. This finding suggests that preschoolers may construct made-up words from a limited set of highly familiar terms, whereas grade schoolers may rely more on partially known terms. Both groups of children are able to circumvent gaps in their lexicons by creating communicatively effective lexical innovations as often and as well as adults. (Author/MSE)

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Words "made-up" by children: An analysis of their form and communicative effectiveness

Jacqueline Liederman

Boston University

Susan Kohn

Veterans Administration Hospital, Jamaica Plain, MA

Maryanne Wolf

Tufts University

Harold Goodglass

Veterans Administration Hospital, Jamaica Plain, MA

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Please forward all correspondence to: Jacqueline Liederman, Ph.D., Boston University, Department of Psychology, 64 Cummington Street, Boston, MA 02215.

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Abstract

The creation of new words through the novel combination of English words or morphemes (e.g. "map ball" or "circle map" to refer to a "globe") was studied in 40 preschool children, 40 grade school children and 40 adults. These "made-up" words or "lexical innovations" were collected while subjects attempted to name pictured objects and were evaluated in terms of incidence, communicative effectiveness, novelty, semantic accuracy, and certain linguistic characteristics. Communicative effectiveness was established by asking naive judges to guess the intended referent of the made-up word. It was expected that the preschool children's innovations would be wild and referentially opaque. Instead, the preschool children's innovations were as frequent and as communicatively effective as those of the grade school children and adults. Grade school children produced the highest proportion of innovations with semantic inaccuracy and contamination, whereas preschool children constructed more innovations which contained redundant elements. This suggests that preschoolers may construct made-up words from a limited set of highly familiar terms, whereas grade schoolers may rely more on partially known terms. Nonetheless, both groups of children are able to circumvent gaps in their lexicons by creating communicatively effective lexical innovations as often, and as well, as adults.

Young children frequently find themselves in situations where their vocabularies are insufficient to communicate what they wish. One way in which children extend their limited lexical repertoire is by creating new words through the novel combination of known words or morphemes (e.g., "map ball" or "circle map" to refer to a 'globe'). Such "made-up" words are referred to as "lexical innovations." While the developmental acquisition of morphological rules has been the subject of much research in child language (Berko, 1958; deVilliers & deVilliers, 1973; MacWhinney, 1975), little attention has been given to this innovative form of morphological combination. This study focuses on such lexical creativity in children as it applies to the renaming of an object whose conventional name is unknown or unavailable[1].

Lexical innovation is known to occur in a variety of populations. Adults construct new words both inadvertently, in the form of slips of the tongue (Fay & Cutler, 1977; Fromkin, 1980) and deliberately, to refer to technological inventions, or to express an idea compactly (Carroll, 1980; Gleitman & Gleitman, 1970; Lees, 1970; Marchand, 1969). Similarly, aphasic and elderly adults create new words in order to circumvent their lapses in word-finding (Liederman, Kohn, Wolf & Goodglass, 1983; Liederman, et al., 1981).

Although the creative use of words is thought to be especially prevalent within preschool children (Gardner, Winner, Bechhofer & Wolf, 1978), their productions are considered to be inferior in a number of ways to those of older children and/or adults. For example, preschool children are said to produce innovations which are referentially opaque and relatively unconstrained by linguistic convention (Clark, 1981, 1982; Clark and Clark, 1979). In a series of studies (Gardner, Kirchner, Winner & Perkins, 1975;

Gardner et al., 1978; Winner, 1979; Winner, Rosentiel & Gardner, 1976), Gardner and his colleagues examined the production of metaphors, similes and/or creative renamings of objects in subjects ranging in age from 3 to 19. A few of the inventions that they classified as figurative language match our criterion for a lexical innovation, e.g., "house-hat" for 'chimney' (Gardner et al., 1978: 12). Across these studies, preschoolers produced a higher proportion of imaginative utterances than grade school children; however, these utterances were often "wild" and seemingly devoid of sense. Gardner suggests that the egocentrism of young children may have prevented them from editing out the production of these idiosyncratic and non-communicative productions.

We collected lexical innovations which were produced during a picture-naming task. We think that this permitted more accurate identification of individual naming attempts than methods using spontaneous conversation. The use of picture naming meant that we knew the intended target. Moreover, the use of our criterion for collecting innovations (i.e., that only one of the morphemes in an innovation needed to be semantically related to the target), meant that we could include in our corpus semantically remote innovations as well as those which were semantically accurate.

To evaluate the claim that the creative language of children is referentially opaque (Gardner et al., 1978; Clark, 1981), we presented the lexical innovations of children and adults to a group of naive judges who were asked to guess the target picture that had prompted these innovations. This enabled us to assess the extent to which these innovations communicated meaning when separated from the original context. This characteristic will be referred to as communicative effectiveness.

There are several other issues which we examined with reference to

children's lexical innovations: whether preschool children rely on this strategy more than grade school children and normal adults; how effectively children employ it; and what characteristics are imposed by children's developing linguistic and cognitive skills. Thus, we compared the innovations of these three groups in terms of incidence, communicative effectiveness, novelty, semantic accuracy, form and the presence of some unusual morpheme combinations which we had previously observed in aphasic patients (Liederman et al., 1983).

Subjects

A picture naming test was administered to 40 preschool children (20m, 20f; $\bar{x}$ age = 4.5 years), 40 grade school children (20m, 20f; $\bar{x}$ age = 8.2 years) and 40 male adults ($\bar{x}$ age = 50 years).

Methods

Stimulus materials. The Boston Naming Test is a picture naming test consisting of 85 black and white line drawings of familiar objects (Kaplan, Goodglass & Weintraub, 1976). The names of the targets cover a wide range of word frequency (e.g., tree, bench, harp, trellis); targets are arranged approximately in order of increasing difficulty (e.g., dart, globe, yoke).

Procedure. The Boston Naming Test was administered individually in a single session. Verbatim responses were recorded by the examiner. The entire BNT was administered to the adults. Testing of the preschool children was terminated after 4 out of 6 successive items were failed, and testing of grade school children was terminated when 6 out of 8 successive items were failed.

Coding

By definition a lexical innovation involved the construction of a novel

name for a target object by combining two or more recognizable morphemes, one of which bore a semantic relationship to the target. Lexical innovations could occur in two ways: 1) two or more morphemes creatively combined to form a new name (e.g., "map ball" for 'globe' and "aimer" for 'dart'), or 2) an existing English word creatively applied as a new name for the target object (e.g., "noisemaker" for (door) 'knocker'). Therefore all of our lexical innovations were either noun + noun or gerund + noun compounds (e.g., "cattle harness" for 'yoke,' "map ball" for 'globe,' and "coloring tray" for 'palette'); or they were nominalized verbs with an -er construction, reflecting the function of the object (e.g., "picker-uppers" and "ice cube holder" for 'tongs,' "twirler-whirler" for 'pinwheel').

Naming errors such as semantic paraphasias and phonemic paraphasias were excluded from the corpus. For example, "baby carriage" was considered a semantic paraphasia rather than a made-up name for a 'cradle,' because it is a standard name for an item which is functionally and contextually related to a cradle. Similarly, "polite" was considered a phonemic paraphasia rather than a lexical innovation for the target 'palette.' Other naming errors such as completion responses were also excluded. A completion response is a production which contains at least one intact morpheme of the original target (e.g., "hourvase" for 'hourglass'). The final group of productions which were eliminated from our corpus were circumlocutions (e.g., "artists use it" for 'palette') and descriptions of the object with an adjective and noun combination (e.g., "flat tray" or "wet tray" for 'palette').

By these criteria, 221 instances of lexical innovation were identified from amongst 1842 incorrect naming responses. The identifications were made by the consensus of seven psycholinguists at the Boston Aphasia Research Unit.[2] Once the lexical innovations were identified, two dimensions were

evaluated: (1) functional characteristics (i.e., communicative effectiveness, novelty, and semantic accuracy), as assessed by naive judges; and (2) linguistic characteristics as assessed by the authors.

For the set of functional analyses, Boston University freshmen, who were native speakers of English, served as naive judges. Fourteen groups, each containing ten judges (n = 140), examined equal numbers of innovations, randomly distributed between groups. The freshmen were told the following information about the innovations: (1) The responses were invented by subjects attempting to produce the standard name of pictured objects. (2) The responses were not acceptable English names for the objects but some were reasonable substitutes and others were not. (3) At the beginning of the experiment the raters were not told what objects the innovations were intended to name. (4) Each attempt could have been produced by either a child, an elderly person, a brain-damaged adult, or a normal adult.[3]

The freshmen raters were asked to perform three types of qualitative judgements for each innovation. First, they judged how "peculiar," "odd," or "novel" the word appeared to them, using a 3-point scale (from 1 = "ordinary-sounding or not novel" to 3 = "very unusual-sounding or novel"). Thus 'novelty' referred specifically to the distance of the innovation from standard linguistic constructions. Next, they were asked to guess the referent of each innovation. Each freshman was permitted one guess; there were, therefore, ten opportunities for each innovation to be correctly identified. When the target of an innovation was correctly guessed by at least one freshman, the innovation was considered to possess 'communicative effectiveness'.[4] Finally, raters were told the target names for which the innovations had been invented, and asked to rate how close in meaning the lexical innovation was to the target word, using a 3-point scale (from 1 =

"very close in meaning or semantically accurate" to 3 = "distant in meaning or semantically inaccurate"). This type of rating will be called 'semantic accuracy'.

For the set of linguistic analyses the authors examined all lexical innovations for the presence of certain features which had previously been observed in the lexical innovations of aphasic adults:

1) Redundancy - where the first morpheme (the modifier) provided information subsequently communicated by the second morpheme (the head noun) (e.g., "waterfish" for 'seahorse').

2) 'Contamination' - where semantically and/or phonologically related words were blended together (e.g., "sanddial" for 'hourglass', as a cross between 'sand' and 'sundial').

3) Anomaly - where the two morphemes were combined in a semantically unclear or misleading manner (e.g., "sand day" for 'hourglass' does not elicit a single semantic interpretation; "water eater" for 'beaver' is unclear because 'water' is not eaten, and because it is consumed by all living creatures and thus does not clearly refer to beaver).

Results

Adults rarely made errors on the confrontation naming test, whereas children were not presented with the entire test. To compare the incidence of innovations between groups, therefore, it was necessary to correct for the number of opportunities to produce innovations. For each subject, the ratio of innovations to the total number of incorrect attempts to name the target was calculated. Naming errors reflecting misperceptions (e.g., "bat" for 'oar') were eliminated, because they do not seem to reflect linguistic difficulty, and were particularly prevalent within the responses of the

children.

Similarly, to compare populations, a mean value which represented the proportion of innovations possessing the feature of interest was calculated for each subject. The following 3 planned comparisons were tested for each data set: each population was contrasted with the adult group; then preschool children were compared with grade school children. To test for homogeneity of variances between groups, Cochran's Statistic was applied to each set of data. When the variances differed to a significant extent ($p < .05$), separate, rather than pooled, variance estimates were used for the planned comparisons. The results reported below are presented in Table 1.

Insert Table 1 about here

Incidence and functional characteristics of lexical innovations.

The proportion of naming errors in the form of lexical innovations did not differ significantly between the preschool, grade school and adult groups: approximately .11 of the naming errors were lexical innovations. For all three groups at least .50 of their lexical innovations were communicatively effective. Although the incidence of communicatively effective innovations did not differ significantly between groups, it should be noted that preschool children produced the highest proportion (.68). The proportion of innovations which was judged to be high in novelty was approximately .33 for all three groups. However, the proportion of innovations which was judged to be low in semantic accuracy was significantly greater in the grade school children than in the adults ($t = 2.36$, $df = 60.2$, $p < .05$). Grade school children also produced a higher incidence of these errors than preschool children, but not at a significant level.

Characteristics of the lexical innovations

The characteristics of the lexical innovations differed significantly between groups. Redundant innovations were significantly more prevalent for the preschool children than for either the adults (t = 2.09, df = 20.5, $p < .05$) or the grade school children (t = 2.57, df = 17.2, $p < .05$). Contamination occurred within a significantly higher proportion of the innovations of grade school children than adults' (t = 2.004, df = 36.6, $p < .05$). The incidence of anomaly did not differ significantly between groups.

Discussion

Our results demonstrate that previous research has underrated the ability of preschool children to fill gaps in their lexicons through the creation of new names from familiar morphemes. Rather than being referentially opaque or devoid of meaning, the innovations of our preschool children were highly effective in their ability to communicate. More than two-thirds of their lexical innovations could be correctly decoded by subjects who were unfamiliar with the original context within which the innovations were produced. In fact, preschool children's innovations were as communicatively effective as those of either grade school children or adults.

There was also no evidence to support the claim that grade school children are less inventive or creative than the preschool children. The probability of resorting to lexical creativity as a means for filling a gap in lexicon knowledge was equal for preschoolers, grade school children and adults: approximately one out of ten failed naming attempts was in the form of a lexical innovation.

The relatively high proportion of redundant forms for the younger children was an interesting finding. These redundant forms suggest a particular

strategy which young children may use to cope with a limited vocabulary and incomplete knowledge of semantic and hierarchical relationships (e.g., class inclusion, Anglin, 1977). When encountering word-finding difficulties, the preschool child may combine or overuse a small set of highly familiar terms. Vihman (1981) suggests that an analogous strategy is found in phonological development. Young children employ a "homonym strategy", where they "merge" a few familiar sounds in their repertoire to create one label for several different referents (e.g., bæ - be for Bobby and bucket; Waterson, 1971 cited in Vihman, 1981: 244).

It is surprising that the redundancy in preschool children's innovations did not impede communicative effectiveness. Preschool children's innovations were as communicatively effective as those of the other two groups. Work by Downing (1977) suggests an explanation for this finding. When her subjects were asked to interpret redundant innovations (e.g., "book novel"), they provided contexts which rendered the elements in the innovations non-redundant, and consequently, properly constructed. For example, instead of interpreting a "book novel" as a "book book", one of her subjects interpreted it as "...a novel about the writing of a book" (Downing, 1977: 832).

Since we expected that preschool children would generally make more errors in morpheme combination than grade school children, exceptions to this pattern deserve attention. Surprisingly, grade school children, as compared to preschool children, produced proportionately more innovations with semantic inaccuracy and contamination. The smaller proportion of semantic inaccuracy and contamination in younger children's innovations is consistent with the view that they overuse a limited set of known terms. In contrast, grade school children, who may be in a period of rapid lexical expansion, may

create lexical innovations from a larger set that includes partially known terms. The use of such unconsolidated lexical information in the older children would then create opportunities for violating rules of morpheme combination.

Whether creative naming in preschoolers is "wilder" than in grade school children or adults remains uncertain. When referring to wildness, Gardner et al. (1978) emphasize cognitive factors. For example, they claim that preschool children use idiosyncratic language because of their egocentric cognitive style and their tendency to cross semantic boundaries in the invention of metaphors. In contrast to younger children, Gardner et al. (1978) suggest that grade school children use more literal language because they are immersed in the process of mastering dictionary-like definitions of words.

Our data did not support Gardner's claim that preschool children are more inventive and creative than grade school children. As noted, the probability of resorting to lexical creativity as a means for filling a gap in the lexicon was equal for preschoolers, grade school children and adults. Although there was a slight tendency for preschool children's innovations to be judged somewhat more 'novel' than grade school children's, this difference did not approach significance.

This paper has demonstrated that when children are confronted with novel or unfamiliar objects, they create novel words as often as adults and as effectively. The occurrence of such effective lexical innovations indicates that even very young children are able to use their rudimentary understanding of the process of reference to extend their limited vocabularies.

Footnotes

(1) A continuum may exist between lexical information that is "unknown" and that which is temporarily "unavailable"; this distinction is especially difficult to determine in children, given the nature of developing lexical systems.

(2) In addition to the authors, the other participants in coding were Drs. Jean Berko Gleason, Eugene Green, and Lisa Menn.

(3) Lexical innovations of aphasic and elderly adults are presented in separate papers (Liederman, Kohn, Wolf and Goodglass, 1983; Liederman et al., 1981).

(4) One should note that the communicative effectiveness of the innovations of adults may have been underestimated. Since normal adults tended to misname targets with the lowest word frequency, their innovations were in response to more difficult items than those of the other groups. The raters judging communicative effectiveness were equal in education to the normal adults (both had only a high school education). Consequently, some of the innovations produced by normal adults may have been quite apt, yet they may not have been guessed by the freshmen raters because they, themselves, could not access the target word. This problem was partially compensated for by adopting a liberal index of communicative effectiveness, i.e. an innovation was considered communicatively effective if one out of ten freshmen could guess the intended referent. Given that the freshmen had no knowledge of the targets, it is well beyond chance expectation if even one of them was able to produce the correct target on the basis of the innovation.

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Table 1

Characteristics of Lexical Creativity in Children and Adults

	Incidence of innovations	Proportion of Innovations with the Following Characteristics					
	Proportion of Naming Errors	High Novelty	Low semantic Accuracy	Communicative Effectiveness	Redundancy	Contamination	Anomaly
Population							
Adults	.10	.28	.16	.53	.04	.00	.03
N =	(73)	(21)	(12)	(39)	(3)	(0)	(2)
Preschool Children	.12	.40	.34	.68	.22 +*	.02	.02
N =	(50)	(20)	(17)	(34)	(11)	(1)	(1)
Grade school Children	.13	.34	.37 +	.50	.02	.06 +	.02
N =	(98)	(33)	(36)	(49)	(2)	(6)	(2)

Note: + = significant difference between children and adults ($p < .05$)

* = significant difference between the preschool and gradeschool children ($p < .05$)